

CALFED Bay-Delta Program

Ecosystem Restoration Program Planning

Development of Implementation Objectives and Targets for Key Resources

Ecological Zone: Upland Tributaries and Watersheds

Ecological Subzone: Tuolumne River (LaGrange Dam to confluence with San Joaquin River)

KEY RESOURCES AND STREAM HABITATS:

Resource Guild: Native anadromous salmonids

Species: Fall-run chinook salmon

Stream Habitat: Upstream migration, adult holding and spawning, egg incubation, juvenile rearing and outmigration

Implementation Objective: Maintain and enhance natural production of fall-run chinook salmon.

Target: Maintain an average cohort replacement rate of > 1.0 .

Action: Utilize artificial production to augment/aid in the recovery of self-sustaining population.

Control illegal harvest.

Protect genetic integrity of population.

Control introduced smallmouth and largemouth bass and other predator populations to reduce predation on juveniles.

Reduce entrainment losses of juveniles at water diversions by installing state-of-the-art fish screens at 36 small pump diversions.

Species: Late fall-run chinook salmon

Stream Habitat: Upstream migration, adult holding and spawning, egg incubation, juvenile rearing and outmigration

Implementation Objective: Determine if a distinct population of late fall-run is present; if a distinct population exists, maintain the population; evaluate the potential for restoration.

Target: No numeric target.

Action: Conduct additional population surveys and genetic studies to determine the presence of a distinct late-fall run population.

Species: Steelhead/rainbow trout

Stream Habitat: Upstream migration, adult holding and spawning, egg incubation, juvenile rearing and outmigration

Implementation Objective: Maintain existing remnant population; evaluate the potential for restoration.

Target: Maintain an average cohort replacement rate of ≥ 1.0 .

Action: Conduct additional surveys, scale and genetic analysis of existing steelhead/rainbow trout populations.

Resource Guild: Native resident fish community

Stream habitat: All life stages

Implementation Objective: Maintain diversity of native fishes.

Target: No numeric target.

Resource Guild: Aquatic macroinvertebrates

Stream habitat: Larval stages.

Implementation Objective: Maintain diverse community of macroinvertebrates.

Target: No numeric target.

KEY ECOSYSTEM FUNCTIONS/PROCESSES AND STRESSORS:

Function/Process: Hydrologic cycle

Stressor: Water diversions disrupt the natural hydrologic cycle, altering the magnitude and timing of streamflows and reducing habitat for key species. Rapid changes in reservoir discharge for peaking power or other purposes can result in salmonid redd dewatering and juvenile stranding.

Implementation Objective: Manage flows to simulate natural ecosystem functions and processes.

Target: See flow analysis (to be developed).

From October 16 through March 15, limit flow fluctuations by increasing flow releases by no more than 1,800 cfs per hour. Limit decreases in flow to 500 cfs/hour at flows below 2,000 cfs; limit decreases to 700 cfs/hour at flows greater than 2,000 cfs or less than 2,700 cfs; limit decreases to 900 cfs/hour at flows above 2,700 cfs and below 4,500 cfs.

Action: Evaluate means of providing instream flows to restore habitat for all life stages of key species.

Evaluate effectiveness of flow fluctuation restrictions on salmonid redd dewatering and juvenile stranding.

Function/Process: Stream temperature regime

Stressor: Water diversions and reservoir management result in altered stream temperatures, reducing habitat for key species.

Implementation Objective: Manage reservoir releases to provide suitable temperatures for all life stages of key resources.

Target: Maintain mean daily water temperatures at or below levels suitable for maintenance of all life stages of key resources.

Action: Evaluate the feasibility of releasing sufficient instream flows to meet temperature targets for key resources.

Evaluate use of temperature control devices/reservoir management options to reduce water temperatures during critical periods.

Evaluate the potential for riparian vegetation restoration to reduce water temperatures.

Evaluate the feasibility of creating low flow channels through deep in-channel gravel pits where warming occurs.

Evaluate the impact of discharge returns on stream temperature.

Function/Process: Sediment Budget/Channel Morphology

Stressor: High rates of sediment input and impaired sediment transport due to altered streamflow result in accumulation of fine sediment in salmonid spawning gravel. Gravel recruitment is interrupted by dams, gravel is removed by extractions, reducing salmonid spawning habitat. Gravel extractions have also modified channel structure, creating good habitat for juvenile salmonid predators.

Implementation Objective: Restore balanced sediment budget.

Target: Maintain sediment input in balance with transport from the system.

Action: Provide flushing/channel maintenance flows as needed.

Restore functional floodplain and river/floodplain hydrology and dynamics where feasible to allow gravel turnover from banks and floodplain.

Facilitate transport of fine sediments by restoring the balance between river channel configuration, flow regime, and sediment supply.

Construct sediment retention basins to reduce fine sediment input.

Encourage implementation of improved land management and livestock grazing practices along stream/riparian zones to reduce streambank erosion and sediment input.

Work with permitting agencies to appropriately condition future gravel extraction permits. Eliminate gravel extraction from active stream channel; strictly regulate removal from floodplain areas.

Implement salmonid spawning and rearing habitat restoration program, including gravel addition, mechanical cleaning of spawning gravel degraded by accumulation of fine materials, and restoration of stream channel to isolate or reduce predator habitat.

Function/Process: Stream shading/nutrient input from riparian vegetation

Stressor: Riparian vegetation removal reduces stream shading, nutrient input, and input of woody debris to stream.

Implementation Objective: Restore self-sustaining diverse riparian community.
Increase habitat complexity through input of large woody debris.

Target: No numeric target.

Action: Restrict further removal of riparian vegetation.

Implement riparian restoration program.

Encourage implementation of improved land management and livestock grazing practices along stream/riparian zones.

Function/Process: Downstream transport of contaminants

Stressor: Point and non-point discharge of contaminants exceeds stream capacity for downstream transport, resulting in toxicity/reduced habitat availability for key species.

Implementation Objective: Reduce point and non-point discharge of contaminants.

Target: Meet existing water quality standards; strengthen existing standards if needed.

Action: Strictly enforce existing water quality standards; strengthen standards if needed.

Encourage implementation of improved land management and livestock grazing practices to reduce contaminant input.